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The material from this horizon, which has been examined by me, consists, 1°, of marls — either calcareous clay marls, or light chalky marls — composed, in the main, of carbonate of lime (the few analyses of these marls which have been made, show an average content of about five per cent of phosphoric acid; they occur across the whole width of the state, and are, in many instances, in very good condition for spreading upon the land: a marl of this kind at Coatopa has already been used with very fine results); 2°, of limestone rock, usually crystalline, hard, and sometimes sandy, but occasionally soft and crumbling; in one locality the calcareous matter has been leached out, leaving a porous sandstone: this limestone, which is the Ripley limestone, holds from ten to fifteen per cent of phosphoric acid, and extends entirely across the state: the aggregate amount of phosphoric acid contained in it is enormous; 3°, of nodular or concretionary masses of phosphate of lime, and nuclei or casts of gasteropods, bivalves, nautili, baculites, etc.; these, wherever examined, appear to be nearly pure phosphate of lime, but are found in comparatively limited quantities: not more than half a dozen quantitative analyses have yet been made of the phosphatic material from these beds; but, in making the qualitative tests, I have always used equal quantities of the different substances, and have thus been able to form some estimate of their comparative value.

The outcrops of the phosphatic beds occurring at the base of the rotten limestone, already described in a former letter, pass near the following places, — Pleasant Ridge, Eutaw, Greensboro, Hamburg, Selma, Prattville, Wetumpka, Tuskegee, and Society Hill, — while the beds now described above, outcrop along a line about thirty miles south of the former, passing through or near the following places, — Livingston, Coatopa, Moscow, Dayton, Prairie Bluff, Minter Station, Fort Deposit, Union Springs, Flora, etc.; the one line of outcrop being along the northern border of the 'prairie region,' the other along its southern border.

It is, further, an interesting fact that the upper beds of the rotten limestone itself are phosphatic. I examined recently the outcropping limestone from Livingston for six miles northward, and in every case found it to be more or less phosphatic; and in a few places I found *nodular* phosphates in small quantity. In other localities, as at Boligee, and between Newberne and Uniontown, at a distance from either border of the rotten limestone, occur phosphatized nuclei of shells. I have not yet had the opportunity of examining the strata at these places, and cannot, therefore, say whether or not the phosphates are confined to these nuclei, but am inclined to think that phosphatized strata occur at intervals through the whole thickness of the rotten limestone, as well as at its base and summit.

Whether any of these phosphates may be profitably shipped to distant points or not, it is certain, that, in the phosphatic marls and greensands, our farmers, in the 'prairie region' at least, have the materials for restoring the fertility of their soils at a comparatively small cost.

EUGENE A. SMITH.

University of Alabama, July 12.

Swarming insects.

I am not a properly qualified reporter of scientific facts, but the following observations have interested me:—

I sat on the doorsteps of 626 Euclid Avenue some days ago, watching the 'Canada soldiers,' of which

gnat-like looking insect I enclose a specimen. They filled the air. They were absolutely myriads. The north wind, I am told, brings them from over the lake; but they are ephemeral, and their dead bodies are almost as numerous on the pavements as their live bodies in the air.

As I sat watching their flight, my attention was attracted to a singular smoke-like appearance on the top of a tall elm which stood at the edge of the street-curb. From the topmost branches of this tree rose vertically into the air four or five waving, flickering tongues of what at first looked like smoke. To describe their peculiar lambent motion, I can think of nothing better than the 'cloven tongues of fire' mentioned in the 'Acts of the apostles;' or the darting, flashing spires of the aurora borealis, only the color was smoky, not fiery. I give a rude delineation. The



waving, playing motion of these smoky spires is simply indescribable. They would fade and re-appear, wave back and forth as if swayed by the wind, mount higher and higher, until sometimes one would leap up twenty, thirty, or forty feet into the air. The look was as if the tree was smoking, the thin wiry columns of smoke streaming up into the sky. Closer examination disclosed the fact that these pillars of smoke in the evening twilight were really columns of winged insects, but whether the 'Canada soldiers,' or a smaller insect, I could not see; and inquiry elicited the further fact that this phenomenon is not exceptional. Perhaps it has already been noted in your journal, but I venture to send you this brief and imperfect account of it. A Cleveland resident, to whom I have read this, is quite confident that it was a smaller insect which was thus disporting itself.

EDWARD ABBOTT.

Cleveland, O., July 9.

[The 'Canada soldier' sent is a large ephemeropterid, found in immense numbers about the Great Lakes. The pulsating swarms of small insects seen about the tree-top were undoubtedly formed of gnats (*Chironomidae*), allied to the mosquitoes. The phenomenon has been frequently witnessed, both in this country and in Europe, to the great astonishment of the spectators. — Ed.]